

Notice of Allowability

Application No.

10/668,549

Examiner

MONICA M. PYO

Applicant(s)

CHANG ET AL.

Art Unit

2161

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 16 January 2009.
2. ☒ The allowed claim(s) is/are 1-4, 8, 10.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

1. As a result of telephone conversation with applicant's representative, it was agreed to cancel claims 5-7, 9, 11-21 and add claims 22-32. Currently, claims 1-4, 8, 10, and 21-32 are pending in this Office Action.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

3. Authorization for this examiner's amendment was given in a telephone interview with Mr. David Shifren on 4/22/2009.

4. **IN THE SPECIFICATION:**

Please amend the specification at page 9, lines 9-12, as shown below:

Accordingly, software components including instructions or code for performing the methodologies described herein may be stored in a machine readable storage medium of one or more of the associated memory devices (e.g., ROM, fixed or removable memory) and, when ready to be utilized, loaded in part or in whole (e.g., into RAM) and executed by a CPU.

5. **IN THE CLAIMS:**

A. Cancel claims 7 and 9.

B. Rewrite claims 1, 4, 8, and 21 as follows:

1. **(Currently amended)** A method of rewriting a query during a database query processing operation, comprising the steps of:

processing the query having one or more target attributes in accordance with at least a portion of a data set producing query results comprising the one or more target attributes and one

or more auxiliary attributes, wherein the one or more auxiliary attributes are not included in the query;

analyzing the query results with respect to the one or more target attributes and the one or more auxiliary attributes to determine a relative selectivity for the one or more auxiliary attributes;

selecting at least one of the one or more auxiliary attributes based at least in part on a ranking of the determined relative selectivity for the one or more auxiliary attributes; and

appending the query with at least one new predicate corresponding to the selected at least one of the one or more auxiliary attributes ~~having a high relative selectivity~~ to form a rewritten query;

wherein the step of analyzing the one or more target attributes and the one or more auxiliary attributes comprises the steps of:

extracting statistics for the one or more auxiliary attributes from the query results;

extracting statistics for the one or more auxiliary attributes from the at least a portion of the data set; and

evaluating the relative selectivity for the one or more auxiliary attributes in accordance with the statistics from the query results and the statistics from the at least a portion of the data set, wherein the step of evaluating the relative selectivity comprises the step of:

comparing a range of the statistics from the query results to a range of the statistics from the at least a portion of the data set for the one or more auxiliary attributes.

4. (Currently amended) The method of claim 3, wherein the step of sampling data records comprises the step of sampling every Nth record from the data set, wherein N is a positive integer greater than or equal to two.

8. (Currently amended) The method of claim [[7]] 1, wherein the step of ~~evaluating the relative selectivity~~ selecting at least one of the one or more auxiliary attributes comprises the step[[s]] of:

~~comparing a range of statistics from the query results to a range of statistics from the at least a portion of the data set for the one or more auxiliary attributes; and~~

~~determining whether the one or more auxiliary attributes is a selective attribute by comparing a ratio of the ranges to a predetermined value.~~

21. (Currently amended) An article of manufacture for rewriting a query during a database query processing operation; comprising a machine readable storage medium containing one or more programs which when executed implement the steps of claim 1.

C. Add claims 22-32 as follows:

22. (New) The article of claim 21, wherein the at least a portion of the data set comprises sampled records from the data set.

23. (New) The article of claim 22, wherein the one or more programs when executed further implement the step of sampling data records from the data set.

24. (New) The article of claim 23, wherein the step of sampling data records comprises the step of sampling every Nth record from the data set, wherein N is a positive integer greater than or equal to two.

25. (New) The article of claim 21, wherein the step of selecting at least one of the one or more auxiliary attributes comprises the step of:
comparing a ratio of the ranges to a predetermined value.

26. (New) The article of claim 21, wherein the one or more programs when executed further implement the step of performing a query processing operation on a data set with a rewritten query.

27. (New) Apparatus for rewriting a query during a database query processing operation, comprising:

a memory; and

at least one processor coupled to the memory and operative to implement the steps of:

processing the query having one or more target attributes in accordance with at least a portion of a data set producing query results comprising the one or more target attributes and one or more auxiliary attributes, wherein the one or more auxiliary attributes are not included in the query;

analyzing the query results with respect to the one or more target attributes and the one or more auxiliary attributes to determine a relative selectivity for the one or more auxiliary attributes;

selecting at least one of the one or more auxiliary attributes based at least in part on a ranking of the determined relative selectivity for the one or more auxiliary attributes; and

appending the query with at least one new predicate corresponding to the selected at least one of the one or more auxiliary attributes to form a rewritten query;

wherein the step of analyzing the one or more target attributes and the one or more auxiliary attributes comprises the steps of:

extracting statistics for the one or more auxiliary attributes from the query results;

extracting statistics for the one or more auxiliary attributes from the at least a portion of the data set; and

evaluating the relative selectivity for the one or more auxiliary attributes in accordance with the statistics from the query results and the statistics from the at least a portion of the data set, wherein the step of evaluating the relative selectivity comprises the step of:

comparing a range of the statistics from the query results to a range of the statistics from the at least a portion of the data set for the one or more auxiliary attributes.

28. (New) The apparatus of claim 27, wherein the at least a portion of the data set comprises sampled records from the data set.

29. (New) The apparatus of claim 28, wherein the processor is further operative to implement the step of sampling data records from the data set.

30. (New) The apparatus of claim 29, wherein the step of sampling data records comprises the step of sampling every Nth record from the data set, wherein N is a positive integer greater than or equal to two.

31. (New) The apparatus of claim 27, wherein the step of selecting at least one of the one or more auxiliary attributes comprises the step of:
comparing a ratio of the ranges to a predetermined value.

32. (New) The apparatus of claim 27, wherein the processor is further operative to implement the step of performing a query processing operation on a data set with a rewritten query.

Reason for Allowance

6. Claims 1-4, 8, 10, and 21-32 are allowed.

The following is an examiner's statement of reasons for allowance:

The prior art fails to disclose a method for rewriting a query during a database query processing operation, comprising, in addition to the other recited features of the claim, the limitation of "selecting at least one of the one or more auxiliary attributes based at least in part on a ranking of the determined relative selectivity for the one or more auxiliary attributes; and appending the query with at least one new predicate corresponding to the selected at least one of the one or more auxiliary attributes to form a rewritten query; wherein the step of analyzing the one or more target attributes and the one or more auxiliary attributes comprises the steps of: extracting statistics for the one or more auxiliary attributes from the query results; extracting statistics for the one or more auxiliary attributes from the at least a portion of the data set; and evaluating the relative selectivity for the one or more auxiliary attributes in accordance with the

statistics from the query results and the statistics from the at least a portion of the data set, wherein the step of evaluating the relative selectivity comprises the step of: comparing a range of the statistics from the query results to a range of the statistics from the at least a portion of the data set for the one or more auxiliary attributes.”

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MONICA M. PYO whose telephone number is (571)272-8192. The examiner can normally be reached on Tu & Thur 7:00 - 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Apu Mofiz can be reached on 571-272-4080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Monica M Pyo
Examiner
Art Unit 2161

04/2009

/Apu M Mofiz/
Supervisory Patent Examiner, Art Unit 2161